

Urolithiasis presenting as right flank pain: a case report

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Background: Urolithiasis refers to renal or ureteral calculi referred to in lay terminology as a kidney stone. Urolithiasis is a potential emergency often resulting in acute abdominal, low back, flank or groin pain. Chiropractors may encounter patients when they are in acute pain or after they have recovered from the acute phase and should be knowledgeable about the signs, symptoms, potential complications and appropriate recommendations for management.

Case presentation: A 52 year old male with acute right flank pain presented to the emergency department. A ureteric calculus with associated hydronephrosis was identified and he was prescribed pain medications and discharged to pass the stone naturally. One day later, he returned to the emergency department with severe pain and was referred to urology. He was managed with a temporary ureteric stent and antibiotics.

Conclusion: This case describes a patient with acute right flank and lower quadrant pain which was

Contexte : La lithiase urinaire se réfère à des calculs rénaux ou urétéraux connus plus communément comme des calculs rénaux. La lithiase urinaire présente une urgence potentielle qui entraîne souvent des douleurs aiguës à l'abdomen, au dos, à la colonne lombaire, au flanc ou à l'aîne. Les chiropraticiens peuvent rencontrer les patients quand ceux-ci éprouvent des douleurs aiguës ou après s'être remis de la phase aiguë et devraient donc connaître les signes, les symptômes, les complications possibles et les recommandations appropriées de gestion.

Exposé de cas : Un homme de 52 ans éprouvant des douleurs aiguës au flanc droit s'est présenté à l'urgence. Un calcul urétéral avec hydronephrose associée a été décelé et on lui a prescrit des analgésiques et on l'a renvoyé chez lui pour passer les calculs rénaux sans intervention. Le lendemain il est retourné aux urgences avec une douleur intense et a été renvoyé à l'urologie, où on lui a posé une endoprothèse urétérale temporaire et prescrit des antibiotiques.

Conclusion : Ce cas décrit un patient souffrant d'une douleur aiguë au flanc et au quadrant inférieur droits. Le diagnostic posé indiquait des calculs urétéraux

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diagnosed as an obstructing ureteric calculus. Acute management and preventive strategies in patients with visceral pathology such as renal calculi must be considered in patients with severe back and flank pain as it can progress to hydronephrosis and kidney failure.

KEY WORDS: urolithiasis, back pain, groin pain

Introduction

Back, flank and groin pain are common symptoms that often lead a patient to consult with a healthcare provider. Typically, chiropractors are consulted for mechanical back pain however a recent survey of American chiropractors indicated that 5.3% of chief complaints are non-musculoskeletal in origin.¹ Within this category was the inclusion of renal calculi which was reported to rarely present to a chiropractic clinic.¹ Although rarely encountered in a chiropractic practice, visceral pathology or injury should be of primary consideration for these practitioners as the clinical symptoms are often very similar and yet the management options are very different.

Urolithiasis often refers pain to the back, flank and groin regions depending on the location of the calculi. Most patients describe the pain as a downward-radiating flank pain that progresses anteriorly into the abdomen, pelvis and genitals as the calculus travels from the kidneys down the ureter and into the bladder.²

In some cases, occlusion of the renal system can follow resulting in nephrolithiasis and eventually kidney failure. The following case describes a patient in which urolithiasis resulted in occlusion of the renal system and nephrolithiasis. Practitioners with a focus on the musculoskeletal system such as chiropractors, physiotherapists and physiatrists need to be aware of alternate causes of back, flank and groin pain.

Case study

History

A 52 year old male presented to the emergency depart-

ment with severe right flank pain radiating to the right lower quadrant. His blood pressure was 154/96, pulse rate was 79 bpm, respiratory rate was 24 breaths per minute and temperature was 36.7° C. The pain was insidious in onset and had an intensity of 10/10 on verbal analog scale which decreased to 8/10 after administration of Toradol and Morphine medications provided in the emergency department. The pain was constant, lasting 3 hours in duration, and he had two episodes of emesis since its onset. He did not report experiencing any chest pain, dyspnea, fever or bowel and bladder dysfunction.

MOTS CLÉS : lithiase urinaire, douleur dorsale, douleur à l'aîne

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His medical history included a similar pain in the left flank two years earlier which was diagnosed as kidney stones.

Physical Examination

His heart rate and respiration were within normal limits. He did not display any signs of edema or nausea, abdominal discomfort or indigestion. His abdomen was soft with diffuse tenderness which increased over the right lower quadrant. Urinalysis revealed a moderate increase in specific gravity (1.030), significant hematuria (3+) and a trace of protein.

Diagnostic Imaging

A right ureteric calculus was apparent on a conventional abdominal radiograph (Figure 3). He was discharged from the emergency department with the hope that he would then pass the stone naturally. Unfortunately, the following day, the patient returned reporting that the medications did not significantly affect his pain and his referral to the urology department was expedited. A computer-

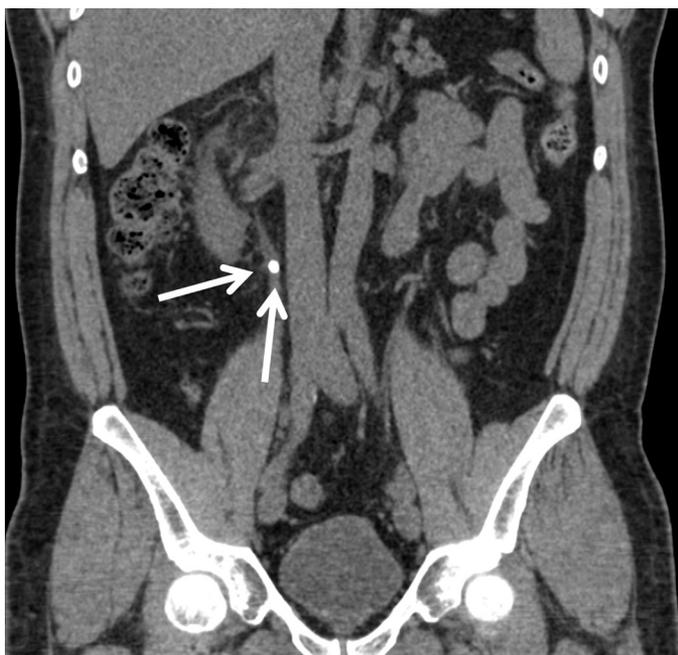


Figure 1. Coronal CT indicating a calcific density in the right proximal ureter.

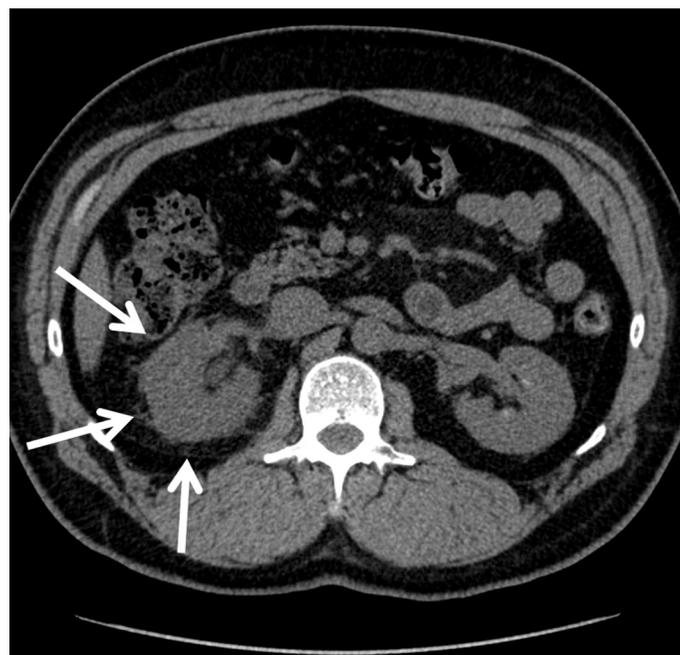


Figure 2. Axial CT indicating hydronephrosis and perinephric stranding in the right kidney.

ized tomography (CT) scan was subsequently obtained which revealed a 7mm calcific density in the right proximal ureter with associated moderate hydronephrosis and perinephric stranding (Figure 1 and 2). Multiple 1-2mm non-obstructing calculi were additionally noted in the left renal parenchyma. The patient was diagnosed with a right ureteric calculus and was managed further managed with pain (Ketorolac, Morphine and Naproxen) and antiemetic medications.

The consulting urologist concluded that because his symptoms were refractory to analgesics, and because the calculus was unlikely to pass on its own, emergency laser lithotripsy was indicated. At the time of this procedure, his urine appeared murky and was presumed to be infected and the lithotripsy was abandoned. As an alternative, a ureteric stent was placed to help drain the dilated and infected collecting system. Antibiotics and Tamsulosin were additionally prescribed. The patient was scheduled for stent and calculus removal two months later and instructed to attempt natural passage of the stone during this period.

Discussion

The prevalence of stones has been rising over the past 30 years and is of concern in an aging population. Several factors may contribute to this rise including improved diagnostic abilities, longer life spans, changes in health related behaviours (eg. consumption of soft drinks and animal proteins), environmental changes, or diuretic utilisation).³⁻⁶ By 70 years of age, 11% of men and 5.6% of women will have a symptomatic kidney stone.⁶ Calculi are typically diagnosed based on the presenting symptoms along with an imaging modality, however, classification of the calculus is based on its composition which requires analysis of the calculus after passage or removal. Conservative treatment options/recommendations are frequently determined and implemented at this point.

The underlying mechanism for calculus formation is that of supersaturation in the urine. Saturation is often described as the concentration ratios of calcium oxalate or calcium phosphate to its solubility. The majority of kidney stones contain calcium (approximately 90% in men and 70% in women) while the remainder consist of cystine

Table 1.
Common mechanical and visceral origins of abdominal, low back, flank, groin pain

Mechanical	Visceral
Sprain/Strain	Pelvic disease (prostatitis, endometriosis, inflammatory diseases, etc)
Discogenic	Renal disease (pyelonephritis, urolithiasis nephrolithiasis, perinephric abscess, etc)
Traumatic fracture	Aortic aneurysm
Compression/Insufficiency fracture	Gastrointestinal disease (cholecystitis, appendicitis, ulcers, etc)
Alignment disorders (scoliosis, kyphosis, spondylolisthesis, etc)	
Arthropathy	

(<1%), pure uric acid (10-15%) and struvite (10-15%).⁷ Calcium based stones are most commonly composed of calcium oxalate, calcium phosphate or both. Several factors can affect stone formation and each need to be addressed once they have been identified.

Various factors can increase an individual's risk of calculus development. Individuals with renal conditions such as polycystic kidney disease or renal tubular acidosis or metabolic syndromes are at increased risk.^{8,9} Additionally, lifestyle and dietary factors such as low urine volume, diets predominantly consisting of animal protein, oxalate or sodium, and abnormal body weight, sedentary activity and stressful life events may increase an individual's risk for calculus development.¹⁰

Urolithiasis is often easily identified due to its classic presentation as is demonstrated in this case. However in certain situations, it is possible that there is a mechanical pain experienced in conjunction with the visceral pain which can often confuse the treating clinician. Table 1 describes some common mechanical and visceral conditions which can present as abdominal, back, flank or groin pain. Deciphering the source of pain is essential to appropriate management as mechanical pain may be relieved temporarily with manual therapy, however the underlying visceral pain is usually persistent unless identified and further managed.¹¹

Diagnosis is usually suspected from a history and examination. Patients often complain of severe back,

flank or groin pain that is colicky in nature. Physical examination often reveals a restless patient with tenderness at the costovertebral angle which is reproduced with gentle tapping. Although a clinician's level of suspicion may be heightened following the history and physical examination, confirmation with diagnostic imaging is often required. Conventional radiographs have been utilised to identify the location and size of the calculus. Figure 3 demonstrates a conventional abdominal radiograph of the patient described in this case revealing a 6-7 mm radiodense concretion in the right ureter (Arrow A). Incidental note is made of a probable pelvic phlebolith (Arrow B) that may be misinterpreted as a distal ureteric or bladder calculi. When circular concretions are located lower in the pelvis, they are more likely to be phleboliths than calculi.

More recently, computerized tomography(CT) has been recognized as the method of choice.^{12,13} Non-enhanced CT affords the ability to rapidly identify the presence of calculi in the urinary system, however, it is not possible to determine the composition of the calculi. Advances in technology have led to the utilisation of dual energy CT which does have added ability to differentiate the stone material by better characterizing the stone material.¹⁴ Although not widely used, the added benefit of dual energy CT can significantly affect the therapeutic options as a trial of urinary alkalinisation is warranted if the calculus is composed of uric acid.

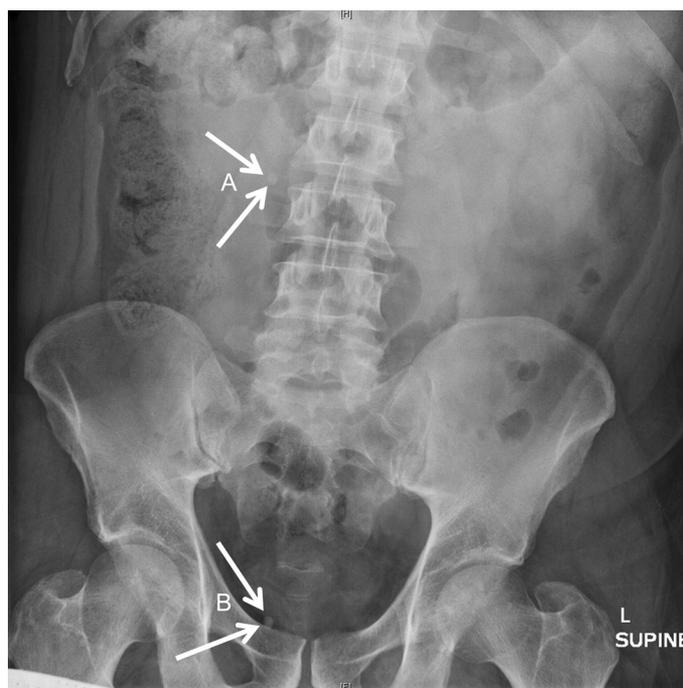


Figure 3. Abdominal radiograph indicating a ureteric calculi (A) and a pelvic phlebolith (B).

Management options follow two distinct routes. In the acute stage, unless there is obstruction, signs of infection, significant bleeding, or persistent pain, removal or fragmentation is not required.¹⁵ In the event that there is significant pain, opioids and nonsteroidal anti-inflammatories are often effective options.¹⁵ This was the initial choice of management for the patient described in this case. Alternatively, a randomized study by Mora et al., demonstrated that Trans Electrical Nerve Stimulation (TENS) was beneficial for decreasing pain, anxiety, nausea and heart rate while increasing satisfaction in acute renal colic episodes that were being transported to the hospital by paramedics.¹⁶ This form of intervention, although transient, may prove beneficial for chiropractors in situations where patients with acute renal pain present and require transportation to the emergency department.

In general, renal calculi that are >10mm in diameter will not pass on their own as compared to those that are <5mm. Calculi between 5-10 mm have variable outcomes and will either pass on their own or require further interventional management. Ureteral calculi are often man-

aged with interventions such as shockwave lithotripsy or laser lithotripsy.¹⁷⁻²⁰ In the context of infection, initial treatment with ureteric stenting and antibiotics is required. For calculi that are present in the kidneys, the intervention is often dependent on the composition of the calculus. Percutaneous nephrolithotomy may be utilised for calculi that are >20mm, staghorn calculi, or calculi that are not able to be removed cystoscopically.²¹ Alkalinisation is often selected to dissolve calculi composed of uric acid.¹⁴

Once the calculus has passed, management should focus on prevention. Healthcare practitioners should focus on educating patients about their future prognosis and risk for future calculus formation. Twenty-six percent of individuals with calculi have been shown to recur symptomatically, while 28% have been found in asymptomatic individuals.²² Hence, approximately 50% of individuals (symptomatic and asymptomatic) with a history of calculus formation may develop subsequent calculi over a 10 year period. Self care and lifestyle modifications are thought to help reduce the risk of recurrence.

Prevention of calculi development requires decreasing supersaturation by increasing the individuals' urine volume and lowering the solubility of calcium oxalate or phosphate. With respect to calculi composed of calcium oxalate, the goal is to raise urine volume while decreasing calcium and oxalate excretion. Increasing daily fluid intake to more than 2 liters has been shown to significantly reduce recurrent calculi formation.²³ Other strategies include dietary modifications such as adapting a low sodium, normal calcium, and restricting foods high in oxalate (spinach, rhubarb, wheat bran, chocolate, beets, miso, tahini and most nuts).²⁴

In situations of metabolic abnormalities such as citraturia, individuals are often instructed to follow a prophylactic therapeutic regimen of potassium citrate while others have suggested utilising alkalinizing substitutes while hydrating such as lemonade.²⁵ A recent trial by Tosukh Wong et al has suggested that this may be beneficial as individuals utilising a lime powder mixed into their drinks had an increase in alkalinizing and citraturic actions as well as provided an antioxidant effect to attenuate renal tubular damage.²⁶ This may prove to be a viable alternative and a simple addition into the management of individuals susceptible to repeated calculus formation.

Much debate exists about the utilisation of probiotics in preventing oxalate supersaturation. The current belief

is that microorganisms such as *Oxalobacter formigenes* are important for metabolising oxalate.²⁷ However, Lieske et al reported that dietary restriction of oxalate resulted in decreased urinary oxalate levels; but, there were no effects of probiotic utilisation.²⁴ The current research in this area is lacking a standardised sample population to conduct trials. Several authors have suggested that probiotic utilisation is beneficial in moderate to high oxalate diets, whereas Lieske's study was performed on individuals with low-oxalate diets. To the authors' knowledge, there is insufficient evidence to support or refute the utilisation of probiotics in prevention of stone development.

Complications of renal and ureteric calculi include: hydronephrosis, renal damage, infection of the urinary tract and urosepsis. Hydronephrosis is a condition in which the urinary system is obstructed causing dilation and swelling of the kidney. Unilaterally, it occurs in 1 in 100 people and is often treated by removing the obstruction as well as undergoing a regimen of antibiotics for infections.¹⁴ If mismanaged or untreated, hydronephrosis can result in permanent kidney damage and potentially renal failure, particularly devastating in an individual with a solitary kidney.²⁸

Conclusion

Urolithiasis can result in severe pain, and emergent situations which require immediate management to ensure protection of the patients' urinary system. This case illustrates a situation in which temporary occlusion of the ureter resulted in moderate hydronephrosis. In the event of an underlying calculus, preservation of the urinary system is of most importance and clinicians need to be cognisant of renal or ureteric calculi when examining a patient with abdominal, back, flank or groin pain. Furthermore, clinicians should be equipped with the knowledge of preventive strategies to educate patients with previous calculi, or those that are susceptible to development. This case highlights the importance of considering visceral pathology in the presence of acute abdominal, low back, flank or groin pain.

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